TRANSFERENCE OF THE TERM "GENOTYPE"

TO THE EDITOR OF SCIENCE: SCIENCE for October 13 just to hand contains announcement of Professor Johannsen's Columbia Lectures. Permit us to protest again in the strongest possible manner against this unwarranted transference of the term "genotype" and change of its meaning. Professor DeVries set a bad example by using "mutation" in a new sense. Is there to be no limit to this rough riding over workers in other branches of biology?

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SCIENTIFIC BOOKS

STEINMETZ'S ENGINEERING MATHEMATICS

THIS book is based upon a lecture course given for some years by the author to students of electrical engineering at Union College. The title might well lead one to expect that here at last is a book by a competent authority presenting the mathematical foundation which in his opinion should constitute a part of the training of every engineer. But upon reading the preface expectations and hopes of this nature are abruptly terminated when the reader learns from the summary paragraph:

"Thus the following work is not intended as a complete course in mathematics, but as supplementary to the general college course of mathematics, or to the general knowledge of mathematics which every engineer and really every educated man should possess."

The book is even further limited in its scope than is indicated by the quoted paragraph. For it is largely devoted to the particular sort of mathematics which is of great service to the electrical engineer only. In spite of this the mastery of its contents would unquestionably not be a useless accomplishment to the student in any branch of engineering.

The first chapter is devoted to an elementary exposition of the properties of the general number or complex quantity and the chapter is replete with graphical illustrations. A particular feature of this chapter showing the usefulness of the theory developed is the discussion of the steam path in a turbine.

In the second chapter is given a discussion of series of the types $1+x+x^2+x^3\ldots$ and $1-x+x^2-x^3+\ldots$, designated as potential series. Examples from electrical engineering problems are given to illustrate the applicability of such series to the development of certain functions. The properties of the exponential function are adequately treated and the subject of differential equations is briefly touched upon.

The third chapter treats quite extensively of trigonometric functions and series. Interesting illustrative problems are discussed.

Chapter IV. deals in an elementary but sufficiently comprehensive manner for the purposes of the engineer with the subject of maxima and minima of functions. Numerous practical examples in electrical engineering are worked out numerically. There is also given a short discussion of the method of least squares with an illustrative example from the theory of the induction motor.

Methods of approximation are treated in Chapter V. This subject, an art in itself, is one which is rarely discussed explicitly in books on mathematics or engineering.

Chapter VI. contains an extensive discussion of the subject of empirical curves and the methods of obtaining analytical equations to fit them.

The eighth chapter and the final one is devoted to methods of numerical calculation. A thorough knowledge of the subject matter of this chapter and that of the two preceding chapters obviously should be a part of the equipment of every computing engineer, electrical or otherwise. A striking feature of the book is the author's continual insistence throughout upon the importance to every engineer of a thorough mastery of the sadly neglected art of numerical computation.

There are two appendices, one containing notes on the theory of functions, the other tables of exponential and hyperbolic functions.

As is common in a first edition, there are numerous typographical errors, but usually they are of such nature as not to cause serious ambiguity to the reader.

The book is published by the McGraw-Hill Book Company, of New York.

A. P. Wills

Geometrie der Kräfte. By H. E. Timerding. Leipzig, Teubner (Teubners Sammlung). 8vo. Pp. xi + 381.

This book is an outgrowth of the author's article "Geometrische Grundlegung der Mechanik eines starren Körpers," in the Enzyklopädie der Mathematischen Wissenschaften (Band IV., 1, pp. 125–189), which consisted principally in an account of the Ball theory of screws. The volume under review goes far beyond that article in its scope, both in dealing with the mechanics of deformable bodies, and in giving presentations of the vector theory and of line geometry. On the other hand it is limited by the desire to present the geometry of forces as an independent subject and to avoid a general treatment of mechanics as such, especially since Webster's treatise appeared as a member of the same series of texts.

The geometry of motion, or kinematics, is better known as a distinct subject than is the geometry of forces. In general the two subjects have similar motives and enjoy similar advantages: both seek to present a purely abstract geometrical analysis of mechanical concepts, and each is suggestive and instructive to the student of geometry as well as to the student of mechanics.

The author seeks to unify and complete the labors of his predecessors—Varignon, Poinsot, Chasles, Moebius, W. Thompson, Ball, Study, and others—to form a symmetrical whole and to create a finished theory of forces "disassociated from all physiological, physical, and metaphysical concepts," which shall apply to the kinetics and statics of rigid bodies, and to the statics of deformable bodies.

The first five chapters are devoted to the theory of vectors, following chiefly Grassman and Hamilton. The notation employed differs from that of each of these writers, and also from that of Gibbs, thus adding another to the many existing notations.[1] The ideas developed in these chapters are used to define the concepts moment of a vector, rotor, dyname; but otherwise little use is made of the vector theory. The author defends this as against prospective criticism, on the ground that the results can be reached by methods of analytic geometry, and that the extensive use of the vector theory would render the work less accessible to beginners. Under the circumstances a complete presentation of the vector theory might have been dispensed with altogether.

The following chapters treat of instantaneous rotation and of forces and dynames. The latter term was introduced by Plücker[2] and has been employed extensively by Study[3] and others, to denote the geometrical concept which corresponds to either a twist or a wrench in Ball's theory.

Chapter VIII. is an elementary presentation of line geometry, which the author, following many others[4] makes his fundamental link between geometry and mechanics. He also sets a bound to geometrical developments as a whole by restricting himself to this topic and its applications.

After a chapter on equilibrium, the theory of screws is presented in detail in six chapters, which form the kernel of the entire book, and indeed constituted the motive for the original project. The chapter on the cylindroid is particularly worthy of notice.

Two chapters on deformable bodies extend the theory beyond the realm of rigid bodies—an extension on which the author lays great weight in the preface.

The remainder of the book deals with the mechanical concepts in distinction to the

[1] See Wilson, *Bulletin of Amer. Math. Soc.*, Vol. 16 (1910), p. 415.

[2] *Philosophical Transactions*, 156, 1866; "Works," I., p. 548.

[3] "Geometrie der Dynamen," Leipzig, 1903.

[4] See, *e. g.*, Klein, *Mathematische Annalen*, Vol. 4.

purely geometrical work that precedes. Here again a treatment of deformable bodies and of elasticity is added to the more usual treatment of the mechanics of rigid bodies.

As a whole the work seems a most satisfactory compilation, to which the author has added materially by careful readjusting and supplementing existing work. The bibliography and references are good.

In being late, the present review has the advantage of referring the readers to a number of admirable reviews already in print; among those most readily accessible are: R. S. Ball, *Nature*, LXXXI., July, 1909, p. 34; Longley, *Bull. Amer. Math. Soc.*, XVI., 1910, p. 493; *Revue Generale des Sciences*, 21, 1910, p. 75. Of these, that by Ball in *Nature* is of course the most interesting on account of the close relation he holds to this theory.

E. R. HEDRICK

GÖTTINGEN, GERMANY,
August, 1911

Material for Permanent Painting. A Manual for Manufacturers, Art Dealers, Artists and Collectors. By MAXIMILIAN TOCH. New York, D. Van Nostrand Co. Pp. 208. Price, $2.00.

It would seem that Mr. Toch had gotten into this small compass practically all that an artist need know about his materials from the standpoint of permanency. Judging from the author's name, one would expect a work dealing solely with pigments: only about half of the book is so employed, the remainder consisting of interesting chapters on the history of painting, preparation of canvasses and other foundations, the causes and remedies for cracking of paintings, their renovation, and the oils and other media used in their production. The articles on the photochemical effects of light and the proper use of madder are especially noteworthy and merit careful study.

Some slight slips in proof reading or unusual spellings are in evidence as, quick silver (two words), cinibar, sulphureted, tuscan, Vanquelin and Guinet; but these will doubtless disappear in the next edition. Indian yellow is stated to be made from camel dung, whereas the commonly accepted source is cow urine.

The work admirably fills a long-felt want and a good knowledge of its contents should be part of the equipment of every painter.

A. H. GILL

NOTES ON METEOROLOGY AND CLIMATOLOGY

THE Savannah-Charleston hurricane of August 27–28, 1911, has been made the subject of a special report by the United States Weather Bureau. This storm resulted in the loss of 17 lives, while the damage to property was estimated at $1,000,000. The synoptic weather charts which form a part of the bulletin show that the storm lingered off the coast for four days before its approach was detected on shore. Though no wireless reports concerning the hurricane had been received, the weather officials in the two cities mentioned observed the characteristics which usually precede such a storm on the morning of August 27. Acting upon orders from the Washington office, they immediately sent out cautionary warnings. The wind continued to increase, and twelve hours later reached a velocity of 106 miles per hour in Charleston. The center of the hurricane reached the coast near Savannah at 8 A.M. of the 28th, the barometer at that station reading 29.02 inches. Moving thence inland, it passed through eastern Georgia with diminishing intensity, recurved over North Carolina, on a course east-northeastward, and passed to sea off the New Jersey coast. It is a noteworthy fact that no storm of tropical or semi-tropical origin has reached the southern or eastern coasts of the United States without warning since September, 1893, when a disturbance of marked intensity devastated the Louisiana coast. At the present time the Weather Bureau is looking forward to the establishment of a service whereby observers regularly employed aboard coast-wise vessels would report weather conditions twice daily to the central office, and thus to provide early infor-